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(54) IMPROVEMENTS RELATING TO BRAKE ADJUSTING PINS

(71) We, SLADE ARTHUR and PAUL WILLIAM JOHNSON, both British Subjects of 6, Beak Hill Drive, Alvechurch, in the County of Worcester, and, 2, Windsor Court, Kings Norton, in the County of Warwick, respectively, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to brake adjusting pins for internal expanding brakes primarily intended for road vehicles.

Internal expanding brakes for road vehicles usually comprise two brake shoes which are pivotally mounted on a back plate and the shoes are urged apart, usually by hydraulic means, so that friction linings of the shoes are caused to bear on an internal cylindrical braking surface of a drum which rotates with the vehicle wheel to be braked. As the friction linings wear down, the brake shoes can be adjusted nearer to the drum and this adjustment is effected by manually rotating a metal brake adjusting pin which is rotatably mounted in the back plate and carries a notched cam which bears on an abutment pin secured to a brake shoe whereby the shoe can be adjusted towards the brake drum against spring action. The brake adjusting pin usually comprises a cylindrical bearing portion which is rotatably mounted in a cylindrical bearing hole in the back plate and at one end of said bearing portion is an annular flange which bears against the outside of the back plate and extending from the flange is an angular, usually square, end to be engaged by a tool such as a spanner. The cylindrical bearing portion of the brake adjusting pin is longer than the thickness of the back plate so that an inner end part of the bearing portion extends beyond the inner face of the back plate and mounted on this inner end part is a strong helical compression spring of which one end abuts the back plate and the other end abuts the side of the notched cam secured to the brake adjusting pin so as to be rotatable therewith. The cam is formed with a square hole which after the brake adjusting pin has been passed through the back plate and the strong spring has been mounted on the pin, is passed onto a cylindrical inner end portion of the metal brake adjusting pin having a diameter less than that of the bearing portion to form a shoulder therebetween and substantially equal to the across-flats dimension of the square hole in the cam and said inner end portion is longer than the width or thickness of the cam so that a projecting end of said inner end portion can be riveted or peened over so as to become deformed to cause said inner end portion to assume a square formation in the square hole in the cam whereby the pin and cam are keyed together and said cam is secured on the pin against said shoulder and the spring is compressed between the cam and the back plate. As the spring is relatively strong, the compression thereof and simultaneous deforming and riveting or peening of the pin can only be performed by special equipment and therefore the brake adjusting pin and the back plate are usually sold, in many instances to private persons, as a unit structure which is quite expensive.

As the outer ends of the brake adjusting pins and the back plates are frequently subjected to water and dirt from the road surface, said pins and back plates become corroded and locked together and also the square ends of the pins become deformed by corrosion so that the pins cannot be rotated for adjustment purposes and when this occurs the entire unit structure comprising the back plate and two brake adjusting pins must be replaced at rather high cost.

It is an object of the present invention to enable a brake adjusting pin and a cam to be easily mounted on and detached from a back plate.

According to the present invention a brake adjusting pin comprises an outer end portion which includes an abutment and a tool engaging part, an intermediate cylindrical bearing portion to be rotatably mounted in a bearing hole in a back plate,

an intermediate cam engaging portion of generally cylindrical formation and of which the circumferential surface is formed as a self-cutting or self-deforming formation capable of cutting or deforming a bore of a cam in a keying manner so that the pin and cam are keyed together against relative rotation, and an inner end screw-threaded portion to receive a nut whereby the cam can be advanced longitudinally of the pin into engagement with the self-cutting or self-deforming formation thereof.

The circumferential surface of the cam engaging portion of the pin is preferably formed with teeth arranged when the cam is advanced longitudinally of the pin into engagement with said portion to deform the bore of the cam thereby to produce a complementary toothed keying formation in the bore. However, other formations may be used on the pin which deform or cut the bore of the cam to key the cam to the pin.

The teeth may be disposed parallel with the longitudinal axis of the pin or in spiral relation to said axis.

The invention also provides a combination of a brake adjusting pin according to the invention and a cam formed with an initially cylindrical bore which is engaged by the cam engaging portion of the pin so that said bore is toothed by said cam-engaging portion whereby the pin and cam are keyed together.

The invention also provides a unit structure comprising the said combination and a back plate of an internal expanding brake in which the pin is rotatably mounted.

The invention also provides a method of assembling said unit structure comprising inserting the inner end portion of the brake adjusting pin into a bearing hole in the back plate, mounting a helical compression spring on said pin at the inside of the back plate, mounting the cam on said pin against the spring and advancing the cam longitudinally of the pin into engagement with the self-cutting or self-deforming surface of the cam engaging portion by engaging a nut with the screw-threaded inner end portion of the pin and advancing said nut along the pin whereby a complementary keying formation is cut or formed in the bore in the cam.

The invention will now be more particularly described by way of example with reference to the accompanying drawings in which:—

Figure 1 is a fragmentary sectional view of a unit structure including a brake adjusting pin;

Figure 2 is a sectional view of the brake adjusting pin only on the lines 2—2 of Figure 1;

Figure 3 is a top-side plan view of the brake adjusting pin shown in Figure 1; and

Figure 4 is a top-side perspective view of the brake adjusting pin.

A back plate 10 of a vehicle brake assembly is of known formation and is made of steel and is provided with one or more cylindrical bearing holes 12 extending through the thickness of the plate and disposed at an appropriate position or positions to receive a brake adjusting pin 14 or pins constructed in accordance with the present invention.

The brake adjusting pin 14 is made of steel of a type which is capable of being hardened or toughened throughout or which is capable of being case-hardened by, for example, a cyanide hardening process and may be finally treated so as to be corrosion resistant.

The pin 14 comprises an outer end portion including an annular abutment or flange 16 which bears against the outside of the back plate 10 and also includes a tool engaging part 18 extending from the outer face of the flange 16, said tool engaging part having four flats formed thereon so as to be effectively of square cross-sectional formation to be engaged by a spanner.

The pin 14 also comprises an intermediate portion 20 of cylindrical formation extending from an inner face of the flange 16 and to avoid the formation of a corner fillet between the flange and said intermediate portion an annular undercut 22 is formed in the inner face of the flange. The diameter of the cylindrical formation 20 is such as to effect a run-fit engagement with the bearing hole 12 in the back plate 10 and the length of the intermediate cylindrical bearing portion is greater than the thickness of the back plate as clearly shown in Figure 1.

Extending from one end of the cylindrical bearing portion 20 is a cam-engaging portion 24 which is of substantially cylindrical formation and is of smaller major diameter than the cylindrical bearing portion 20 so that an abutment shoulder 26 is provided therebetween. The circumferential surface of the cam-engaging portion 24 is formed with teeth 28 which are substantially V-shaped or triangular as shown in Figure 2 and these are conveniently straight i.e. parallel with a longitudinal axis A—A of the pin. The teeth may be relatively small in cross-section and there may be, for example, twenty-four equiangularly spaced apart teeth of which the flanks define an angle of approximately 60° so that the teeth have a radial depth of approximately 0.006 inches. The corners of the teeth 28 are chamfered at the inner end face 30 of the cam engaging portion so as to facilitate a self-deforming action on a bore of a cam 32 when the cam is advanced longitudinally along the pin as hereinafter described.

Extending from the cam-engaging portion 24 is an inner end screw-threaded portion 34 of which the major diameter is less than the minimum diameter of the toothed cam-engaging portion 24. The length of the screw-threaded portion 34 is greater than the width of the cam 32 so as to enable the cam to be passed over the screw-threaded portion up to the inner end face 30 of the cam-engaging portion 24 and also to permit a nut 36 to be engaged with the screw-threaded portion 34.

Conveniently the brake adjusting pin may be formed from a cold-forging or cold-headed blank on which the teeth 28 and screw-thread 34 are simultaneously knurled and roll-formed respectively.

The cam 32 to be mounted on the brake adjusting pin 14 has a peripheral cam edge (not shown) of conventional spiral formation formed with notches by, for example, a coining press operation so as to have a snap-action engagement with a cylindrical abutment pin on a brake shoe.

The cam 32 is made as a pressing from sheet metal such as mild steel which is not case hardened and is formed with an initially cylindrical bore 38 of which the diameter is between the major and minor diameters of the toothed cam-engaging portion 24 so that after the cam 32 and the nut 36 are mounted on the screw-threaded portion 34 as previously referred to and the nut is then tightened or advanced along the portion 34, the cam 32 is also advanced along the toothed cam-engaging portion 24 which effects a self-deforming action on the bore 38 of the cam which is therefore toothed in a complementary manner to the portion 24 and the tightening action of the nut is continued until the cam bears against the abutment shoulder 26 and in this position the cam is keyed securely to the pin so that relative rotation between the cam 32 and the pin 14 is positively prevented.

The nut 36 preferably has a tight-fit engagement with the screw-threaded portion 34 and may be a self-locking type nut.

It should be appreciated that prior to the cam 32 and nut 36 being mounted on the pin 14 said pin has previously been inserted through the cylindrical bearing hole 12 in the back plate 10 and a strong compression spring 40 has been mounted on the inner end of the cylindrical bearing portion 20 projecting beyond the inner face of the back plate 10 so that said strong spring becomes compressed by the cam 32 when said cam finally bears against the abutment shoulder 26.

By engaging the squared end 18 and the nut 36 with spanners, the nut can easily be advanced along the screw-threaded portion 34 during assembly, even against the action of the strong spring 40, and can easily be removed should replacement of the pin and cam be necessary at a later date and for which purpose the pin, after the nut 36 has been removed therefrom, can be driven through the cam and out of engagement therewith probably after applying penetrating or a similar oil to the various parts which may have become corroded.

The invention therefore enables a brake adjusting pin and a cam to be easily mounted on and detached from a back plate of a vehicle internal expanding brake.

WHAT WE CLAIM IS:—

1. A brake adjusting pin comprising an outer end portion which includes an abutment and a tool engaging part, an intermediate cylindrical bearing portion to be rotatably mounted in a bearing hole in a back plate, an intermediate cam engaging portion of generally cylindrical formation and of which the circumferential surface is formed as a self-cutting or self-deforming formation capable of cutting or deforming a bore of a cam in a keying manner so that the pin and cam are keyed together against relative rotation, and an inner end screw-threaded portion to receive a nut whereby the cam can be advanced longitudinally of the pin into engagement with the self-cutting or self-deforming formation thereof.

2. A brake adjusting pin according to Claim 1, wherein the circumferential surface of the cam engaging portion of the pin is formed with teeth arranged when the cam is advanced longitudinally of the pin into engagement with said portion to deform the bore of the cam thereby to produce a complementary toothed keying formation in the bore.

3. A brake adjusting pin according to Claim 2, wherein the teeth are V-shaped in cross-section.

4. A brake adjusting pin according to Claim 3, wherein the flanks of each tooth define an angle of approximately 60°.

5. A brake adjusting pin according to Claim 4, wherein twenty four teeth are equiangularly spaced apart around the cam engaging portion of the pin.

6. A brake adjusting pin according to any of Claims 2 to 5, wherein the teeth are disposed parallel with the longitudinal axis of the pin.

7. A brake adjusting pin according to any of Claims 2 to 5, wherein the teeth are dispposed in spiral relation to the longitudinal axis of the pin.

8. The combination of a brake adjusting pin according to any one of the preceding claims and a cam formed with an initially cylindrical bore which is engaged by the cam engaging portion of the pin so that said bore is cut or deformed by said cam engaging portion whereby the pin and cam are keyed together.

9. A unit structure comprising the combination of a brake adjusting pin and a cam according to Claim 8 and a back plate of an internal expanding brake in which the pin is rotatably mounted.

10. A method of assembling a unit structure according to Claim 9 comprising inserting the inner end portion of the brake adjusting pin into a bearing hole in the back plate, mounting a helical compression spring on said pin at the inside of the back plate, mounting the cam on said pin against the spring and advancing the cam longitudinally of the pin into engagement with the self-cutting or self-deforming surface of the cam engaging portion by engaging a nut with the screw-threaded inner end portion of the pin and advancing said nut along the pin whereby a complementary keying formation is cut or formed in the bore in the cam.

11. A brake adjusting pin constructed substantially as described herein with reference to and as shown in the accompanying drawings.

12. The combination of a brake adjusting pin and a cam constructed substantially as described herein with reference to and as shown in the accompanying drawings.

13. A unit structure constructed substantially as described herein with reference to and as shown in the accompanying drawings.

14. A method of assembling a unit structure substantially as described herein with reference to the accompanying drawings.

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1386078 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

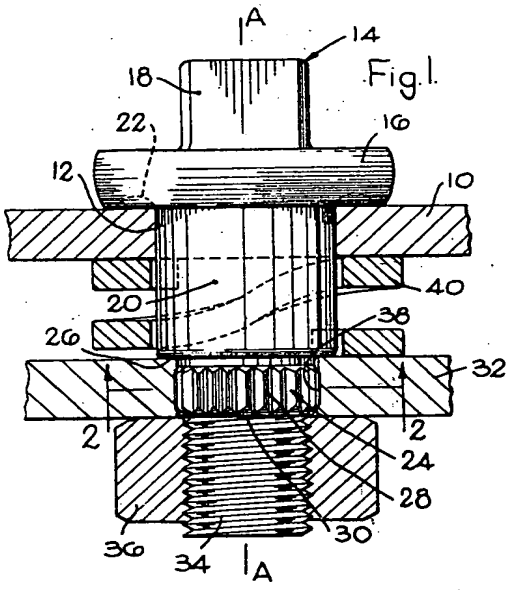

Fig.1.

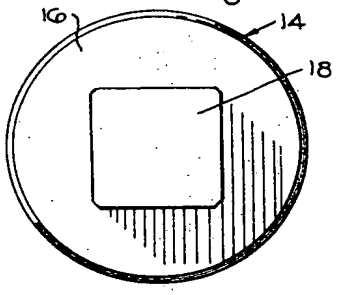

Fig.3.

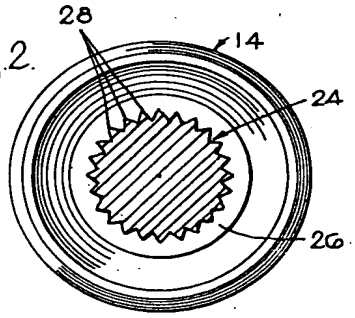

Fig.2.

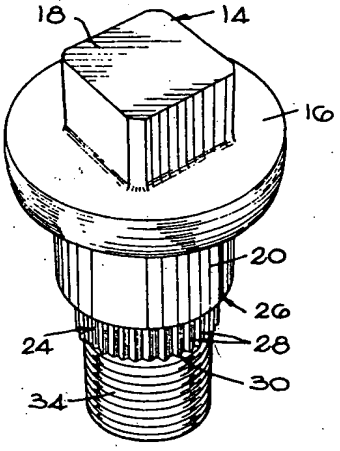

Fig.4.

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